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(54) IMAGE READER

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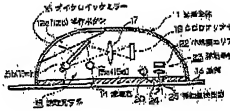

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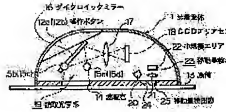
(54) **IMAGE READER**



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CLAIMS

[Claim(s)]
[Claim 1] The image reader characterized by having a reading means for it to be contained in an equipment case and to read the image of the field of the request in a manuscript optically, and a detection means for it to be contained in said equipment case and to detect optically the information relevant to a motion of the equipment case concerned.
[Claim 2] Said detection means is an image reader according to claim 1 characterized by having a lighting means to illuminate a manuscript side, and the area mold image sensors which receive the reflected light from the manuscript side based on the illumination light by this lighting means.
[Claim 3] Said detection means is an image reader according to claim 1 characterized by detecting optically the movement magnitude on the manuscript side of said equipment case.
[Claim 4] The aforementioned reading means is an image reader according to claim 2 characterized by having a lighting means to illuminate the field of said request in a manuscript, and the area mold image sensors which receive the reflected light from the manuscript side based on the illumination light by this lighting means, and the number of

pixels and read-out frame rate of each area mold image sensors of the aforementioned reading means and said detection means differing from each other.

[Claim 5] The image reader according to claim 4 characterized by using a part of image pick-up area in the area mold image sensors of the aforementioned reading means as area mold image sensors of said detection means.

[Claim 6] The area mold image sensors of the aforementioned reading means are image readers according to claim 5 characterized by being X-Y address type image sensors.

[Claim 7] The image reader according to claim 4 characterized by switching the drive timing of the image sensors of the aforementioned reading means in the reading mode by the aforementioned reading means, and the detection mode by said detection means.

[Claim 8] The image reader according to claim 4 characterized by switching the lighting of the manuscript side by each lighting means of the aforementioned reading means and said detection means in the reading mode by the aforementioned reading means, and the detection mode by said detection means.

[Claim 9] The lighting means of said detection means is an image reader according to claim 4 characterized by being arranged so that the lighting direction may not intersect the lighting direction of the lighting means of the aforementioned reading means.

[Claim 10] The image reader according to claim 4 characterized by the spectral characteristics of each lighting means of the aforementioned reading means and said detection means differing mutually.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the so-called mouse combination mold image reader which has the function of the mouse which is one of the pointing devices which input the coordinate location on a screen especially about the image reader which reads the image information of the request field in a manuscript alternatively using area mold image sensors.

[0002]

[Description of the Prior Art] To the image reader of the type which reads

the whole manuscript, it is small and there is an image reader of the type which reads only the required part in a manuscript image. Although what uses linear mold image sensors (it is hereafter called a linear sensor for short) was in use as image sensors used for this type of image reader, since the body of equipment was moved by the manual scan, scan nonuniformity generated a part for the read station on a manuscript, and there was a problem on which an image is distorted.

[0003] There is an application which reads the information pattern in manuscripts, such as a two-dimensional bar code, as an application of the image reader which, on the other hand, reads only the required part in an image. However, if the above-mentioned image distortion occurs in this application, the recognition precision of a pattern will worsen. For this reason, mastery for precision to improve a manuscript a manual scan will be required of a user, and user-friendliness will become bad as a result.

[0004] Considering such a problem, for the application which reads an information pattern, although it is desirable to incorporate a full screen by single shot using area mold image sensors (for it to be hereafter called an area sensor for short), since the manuscript side is large compared with the method which used the linear sensor, there is a problem to which optical system becomes large.

[0005] By the way, if it is actually going to equip PC (personal computer) with the image reader of the application which reads information patterns, such as a two-dimensional bar code, as the peripheral device, the problem of occupying many tooth spaces on a desk will surely arise. Moreover, the configuration and the feeling of a grip of the mouse as a peripheral device are well considered in human engineering, and such its a configuration is desirable also as a code reader.

[0006] However, when PC is equipped with two peripheral devices (a mouse / code reader) of the similar configuration, it is easy to produce derangement at the time of actuation, such as planning to operate a mouse and operating a code reader. Furthermore, although it is mobile, and that to which the peripheral device also fitted the cellular phone is desirable when using a personal computer, that equipment's being set to two and equipment are enlarged will move against such mobile-oriented flow.

[0007] if it thinks from such a viewpoint -- an image reader and mouse equipment -- unifying -- in addition -- and not enlarging is desirable. Thus, the proposal of making an image reader and mouse equipment into one is made partly until now. There is a pointing device combination picture input device (refer to JP,61-134830,A) which contains the reader

and mouse using a linear sensor to one case, specifically makes the location detection function of a mouse serve a double purpose, and detected the reading station of a hand feed type linear sensor reader.

[0008] Furthermore, it has a mouse function and an image reading function using a linear sensor. The input unit (refer to JP,63-318625,A) which has two or more set ability of a configuration of switching these functions, The mouse (refer to JP,2-210523,A) of a configuration of having printer ability and an image reading function using a linear sensor, A read station is attached to a mouse, you make it a location detection function interlocked with, a manuscript image is scanned, and mouse equipment (refer to JP,11-7356,A) equipped with the optical reader ability of a configuration of compounding in a big image etc. is known.

[0009]

[Problem(s) to be Solved by the Invention] However, it is not a thing aiming at each of these conventional techniques using a linear sensor as image sensors, and aiming at reading the image of the big range, moving a mouse, aiming at the code information within the limits that the manuscript was restricted, and reading.

[0010] Moreover, a CCD (Charge Coupled Device) mold area sensor (CCD area sensor) and a lens are built into the interior of the mouse which performs location detection with a ball and an encoder, and the equipment of a configuration of reading a fingerprint is also proposed (refer to JP,11-203041,A). However, since there is no optical description, such as a problem of the image surface inclination resulting from a reading side inclination, in the official report concerned, it is lacking in actuality.

[0011] And on the drawing, since there is no clinch of an optical path, it is extent which can perform image reading of the range of at most 10mm or less, judging from an optical dimension, like the optical path length from a body side to an image formation side is short, and the equipment which reads information patterns, such as a two-dimensional bar code with a certain amount of magnitude, has not been turned to.

[0012] Here, the configuration in the case of containing the reading optical system containing the area sensor for sticking equipment in a manuscript and reading code information in a mouse case is considered.

[0013] When even a sensor substrate includes noting that only the tooth space which folds up about 30x20x60mm optical system is required as size from the manuscript section to the sensor section and it turns up by one mirror in order to constitute the reading optical system which reads one of the graphics display specification, and VGA (640 pixels x 480

pixels) size by 600dpi (dot per inch), the volume with a width-of-face 30x height 30x depth of about 70mm will be taken.

[0014] On the other hand, as shown in drawing 26 , as for the movement magnitude detection equipment of the conventional type which combined a ball 101 and two rotary encoders 102,103, volume of 45x45x20mm - about 50x50x25mm is needed. In addition, in drawing 26 , to a roller 104,105, the pressure welding of the ball 101 is carried out by the thrust of the spring roller 106, and a roller 104,105 is in the condition of having combined with the rotary encoder 102,103 through the revolving shaft 107,108.

[0015] In addition to the reading optical system mentioned above and the movement magnitude detection equipment of a conventional type, the switch corresponding to the signal-processing system which makes signal processing after reading, a lighting means to illuminate a manuscript, and a mouse click carbon button etc. will be contained in a mouse case. However, it is impossible to usually contain these all in the mouse case of size, and size of a mouse case must be enlarged. Consequently, equipment will be enlarged and it will become a request of wanting to use for a mobile application combining cellular phone PC, and the thing which was widely different.

[0016] This invention is made in view of the above-mentioned technical problem, the place made into the purpose also has a function as a pointing device while being able to read correctly the image of a reading station required of an easy configuration, and it is small and is in offering the image reader suitable for pocket use.

[0017]

[Means for Solving the Problem] The image reader by this invention is contained in an equipment case, and has composition equipped with a reading means to read the image of the field of the request in a manuscript optically, and a detection means for it to be contained in an equipment case with this reading means, and to detect optically the information relevant to a motion of the equipment case concerned.

[0018] In the image reader of the above-mentioned configuration, this equipment will have two functions of the function to read a manuscript image, and the function to detect the information relevant to a motion of an equipment case, by a reading means and a detection means being contained in the same equipment case. Especially, since a detection means is the configuration detected optically, equipment is not enlarged.

[0019]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail with reference to a drawing.

[0020] [1st operation gestalt] drawing 1 is the internal configuration Fig. showing the outline of the configuration of the image reader concerning the 1st operation gestalt of this invention. Drawing 2 is the plan of the case.

[0021] In drawing 1 and drawing 2 , the equipment case 11 is making the configuration which curved so that the upper part might tend to have fitted a palm, and equips the anterior part with two manual operation buttons 12a and 12b. These manual operation buttons 12a and 12b are formed in order to input the actuation information by click actuation by PC user, and they have light transmission nature.

[0022] And in order to prevent the red component of an unnecessary disturbance light entering in the equipment case 11, manual operation buttons 12a and 12b have the spectral characteristic of the cyan color which absorbs a wavelength component 600nm or more, as shown in drawing 3 . In addition, in the following explanation, the manual operation buttons 12a and 12b which have light transmission nature shall be called for short the transparent manual operation buttons 12a and 12b.

[0023] The reading aperture 14 which demarcates the reading area of a manuscript 13 is formed in the base in the equipment case 11 at the lower part location of manual operation buttons 12a and 12b. Moreover, red LED (light emitting diode) 15a-15d is arranged at a time in the one upper part of four corners of the reading aperture 14 as a lighting means for illuminating the reading area of a manuscript 13 through this reading aperture 14.

[0024] As this LED 15a-15d for manuscript lighting, that whose peak wavelength is about 660nm is used. The LED [for manuscript lighting / 15a-15d] spectral characteristic is shown in drawing 4 . And these LED 15a-15d illuminates the whole area of 21x28mm size as opposed to a manuscript 13 through the reading aperture 14.

[0025] Moreover, the dichroic mirror (dichroic mirror) 16 is formed above the reading aperture 14 in the condition of having inclined to the base of the equipment case 11. Wavelength reflects light 600nm or more, and this dichroic mirror 16 has the spectral characteristic which is penetrated about the light which is less than it, as shown in the property Fig. of drawing 5 . In the property Fig. of drawing 5 , a broken line shows a reflection factor and the continuous line shows permeability, respectively.

[0026] Thereby, a dichroic mirror 16 makes the operation which divides the optical path for reading the optical path for observing the condition of a manuscript 13, and the image of a manuscript 13. That is, about the

light in which wavelength is less than 600nm among the light which spaced and carried out incidence of the transparent manual operation buttons 12a and 12b, a dichroic mirror 16 is spaced and incidence can be further carried out to the interior of the equipment case 11.

[0027] Thus, the light in which wavelength is less than 600nm spaces a dichroic mirror 16 from the exterior of the equipment case 11, and a manuscript 13 is irradiated, and when the light in which wavelength is less than 600nm among the light further reflected with the manuscript 13 penetrates a dichroic mirror 16, manual operation buttons 12a and 12b are spaced from the exterior of the equipment case 11, and the condition of a manuscript 13, for example, a reading station, can be checked. That is, the transparent manual operation buttons 12a and 12b will also have the function as an inspection hole to check the reading station of a manuscript 13.

[0028] In the equipment case 11, the image formation lens 17 and the CCD area sensor 18 are further arranged on the right-hand side of the dichroic mirror 16. From the dichroic mirror 16 side, this image formation lens 17 and the CCD area sensor 18 are allotted so that an optical axis may become almost parallel to a base in that sequence.

[0029] Since the dichroic mirror 16 has the property of reflecting light with a wavelength of 600nm or more as point ** was carried out, it reflects further the reading light (reflected light) in which the peak wavelength which emits light by LED 15a-15d for manuscript lighting is reflected from the reading area of a manuscript 13 based on the illumination light which is about 660nm in the direction of the image formation lens 17 and the CCD area sensor 18.

[0030] The image formation lens 17 carries out image formation of the reading light reflected with the dichroic mirror 16 on the image pick-up side of the CCD area sensor 18. With the image formation lens 17, the CCD area sensor 18 carries out photo electric conversion of the manuscript image by which image formation was carried out per pixel, and outputs it as an analog picture signal. As this CCD area sensor 18, it is 100 pixels of hundreds of pixel x numbers, and the thing of the spec. of per second 30 frames is used, for example.

[0031] The reading optical system 19 which reads, the image information, for example, the code information, on a manuscript 13, is constituted by LED 15a-15d for manuscript lighting and the dichroic mirror 16 which were mentioned above, the image formation lens 17, and the CCD area sensor 18. And since fluctuation of the reading conditions under the effect of disturbance light can be suppressed to the minimum by dividing the optical path for spacing the transparent manual operation buttons

12a and 12b, and observing the condition of a manuscript 13, and the optical path of the reading optical system 19 with a dichroic mirror 16, while being stabilized and being able to perform reading of a manuscript image, a reading station can be checked certainly.

[0032] It becomes the posterior part from the strong directivity LED 20, the image formation lens 21, and the small-scale image sensors 22 in the equipment case 11, and the movement magnitude detection equipment 23 which detects the movement magnitude (the migration direction is included) on the information relevant to a motion of the equipment case 11, for example, a manuscript, is formed. In addition, the arithmetic circuit containing CPU which performs data processing later mentioned besides the above-mentioned component shall also be included in movement magnitude detection equipment 23. The strong directivity LED 20 illuminates area with a diameter of about 4mm partially through a hole 24 to a manuscript 13. Incidence of the reflected light from a manuscript 13 based on this illumination light is carried out to the image formation lens 21 through the movement magnitude detection aperture 25, and image formation is carried out on the image pick-up side of the small-scale image sensors 22 with this image formation lens 21.

[0033] The movement magnitude detection equipment 23 of the above-mentioned configuration reads the information from a manuscript 13 with the small-scale image sensors 22, and detects the movement magnitude of the body of equipment from the correlation operation. The small-scale image sensors 22 have the 36 pixel x36 pixel number of pixels, and read information for the reading range of about 3mm in 12 dot(s)/mm resolution. About the reason for having set up such a number of pixels, it mentions later. As conjugation length of the image formation lens 21, about 8mm is enough. Therefore, a big tooth space is not taken within the equipment case 11.

[0034] Drawing 6 is the block diagram showing the configuration of the electric system of the image reader concerning the 1st operation gestalt, and attaches and shows the same sign among drawing to drawing 1 and an equivalent part.

[0035] In drawing 6 , the actuation signal of the manual operation buttons 12a and 12b with the function of the click carbon button of a mouse is sent to CPU31 in this equipment. CPU31 exchanges information between the bodies of PC through the USB (Universal Serial Bus) driver 32, and switches image reading mode (code information reading mode) and movement magnitude detection mode. According to a switch of this mode of operation, CPU31 drives LED 15a-15d for

manuscript lighting (for code information reading), or LED20 for movement magnitude detection lighting.

[0036] Moreover, amplifier 34 and 37 and A/D converters 35 and 38 are formed to two image sensors 18 and 22 formed corresponding to each mode of operation, respectively. The reading data which passed through these amplifier 34 and 37 and A/D converters 35 and 38 are sent to ASIC36 for image processings (application specific integrated circuit), and the data by which the image processing was carried out here are sent to CPU31. Moreover, the mode switch signal in image reading mode and movement magnitude detection mode is sent to ASIC36 from CPU31.

[0037] Then, actuation by each mode of operation is described. It begins from the time of PC starting of a body, and this equipment is in movement magnitude detection mode in standard actuation. In this condition, CPU31 drives the small-scale image sensors 22 while it chooses LED20 for movement magnitude detection lighting and carries out a lighting drive. The reading information on the small-scale image sensors 22 is sent to ASIC36 for image processings through amplifier 37 and A/D converter 38. In ASIC36, movement magnitude information is searched for by the correlation processing operation mentioned later. This movement magnitude information is sent to CPU31 from ASIC36, and is further sent to the body of PC via the USB driver 32.

[0038] On the other hand, in case it goes into image reading mode, as the S/W screen corresponding to a code information input is started beforehand and it is shown in drawing 7 , it goes into code information reading mode by left-clicking the S/W carbon button 39 for performing a code information input with a mouse (left-hand side manual operation button 12a being clicked). The state transition in this case is shown in drawing 8 .

[0039] If it goes into code information reading mode, CPU31 will switch off LED20 for movement magnitude detection lighting, will also stop the drive of the small-scale image sensors 22 further for movement magnitude detection, and will transmit only mouse button click information (actuation signal of manual operation buttons 12a and 12b) to the body of PC while suspending transmission of the movement magnitude information on the body of PC.

[0040] And when CPU31 is left-clicked, it sends the click information, i.e., the actuation signal of manual operation button 12a, to the body of PC. Then, the body of PC transmits the signal which directs the purport which shifts to image reading mode to CPU31 in response to this click information. While carrying out the lighting drive of LED 15a-15d to which CPU31 illuminates a manuscript 13 in response to the indication

signal, synchronizing signals, such as a vertical synchronization and a horizontal synchronization, are sent to the CCD driver 33 which drives the CCD area sensor 18.

[0041] The CCD driver 33 supplies various kinds of driving pulses, such as a perpendicular, and a perpendicular transfer pulse, a level transfer pulse for carrying out a level transfer, for the read-out pulse for reading a signal charge to the CCD area sensor 18, and a signal charge based on synchronizing signals, such as a vertical synchronization and a horizontal synchronization. The CCD area sensor 18 performs photo electric conversion for every pixel by which two-dimensional arrangement was carried out, and outputs it as an analog picture signal.

[0042] This analog picture signal is sent to ASIC36 for image processings through amplifier 34 and A/D converter 35. And the image data by which the image processing was carried out here is buffered by the memory in CPU31. It stops the drive of the CCD area sensor 18 while it switches off LED 15a-15d, when CPU31 transmits the buffered image data to the body of PC through the USB driver 32 and transmits the image information for one screen to the PC side. And succeedingly, while carrying out the lighting drive of LED20 for movement magnitude detection lighting, the small-scale image sensors 22 are driven and it goes into movement magnitude detection mode.

[0043] Here, the correlation processing operation performed by the image processing ASIC 36 in the case of movement magnitude detection mode is described below.

[0044] The image data read in two continuous reading actuation is respectively set to D1 (i, j) and D2 (i, j). Here, i and j are suffixes which show the two-dimensional position coordinate on a digital image. At this time, the operation expression of an image correlation operation is {sigmaij=1 - MD1 (i, j) and D2(i+m, j+n)/{sigmaij=1 - MD1 (i, j)}/{sigmaij=1 - MD2 (i, j)}.

It comes out. m and n are changed, this count is performed and maximum is looked for. At this time, m and n which give maximum are the movement magnitude between 2 images.

[0045] The example of the easy single dimension operation for drawing 9 shows the example of this processing. The result of having carried out the **4-pixel correlation operation by the aperture for 20 pixels serves as this drawing (b) for being data for 30 pixels as both an image 1 and the image 2 show in this drawing (a). When a mutual aperture is shifted from now on, a correlation operation is carried out, and both wave laps, it turns out that an operation value has a peak.

[0046] By the way, if it is going to detect big movement magnitude in

order to detect to a quick motion of a mouse (body of equipment) at this time, processing size of an image correlation operation must be enlarged. However, if it is going to enlarge processing size, since the count of an operation will increase in proportion to the square of processing size, the processing time will start too much.

[0047] On the other hand, if it is going to cope with a large motion of a mouse, since it becomes unnecessary to detect big movement magnitude by correlation processing, the scale which performs correlation processing becomes small, and there are few operation durations and they can be managed with making the incorporation period of an image quick. For example, if it is going to incorporate in 1 / 30 seconds which is the taking-in period of the usual area mold image sensors when it is going to detect to the passing speed of per second 1.5m, it is necessary to extract the data of **50mm a minute of successive range.

[0048] The **600-pixel range needs to be read, and about 60 **** (= 12x12x1200x1200x30) are needed for the top which needs image sensors with a big size of 1212x1212 pixels, when this sets reading resolution to 12 dot(s)/mm also for the count of multiplication required for a correlation operation per second noting that a correlation operation is taken by the aperture which is 12x12 pixels. Even if it calculates this with the operation speed of 100MHz, it is huge computational complexity which needs 6000 parallel operation.

[0049] However, what is necessary is for the range of **12 pixel to be sufficient, and just to capture a 36x36 pixels (**1mm minute of apertures) image in 12 dot/mm reading resolution, noting that a correlation operation is carried out by the 12x12-pixel aperture (1mm angle) since only **1mm a minute of successive range should carry out data extraction when a taking-in period is raised to per second 1500 times. Moreover, the count of multiplication required for a correlation operation can also be managed with about 1,200,000 times (= 12x12x24x24x1500) per second, and serves as a realistic numeric value.

[0050] The example of a configuration of the data-processing section in ASIC36 which performs such an operation is shown in drawing 10 . In this drawing, the input of the output signal of the CCD area sensor 18 for code information reading and the output signal of the small-scale area sensor 22 for movement magnitude detection is switched by the input transfer switch 41, and a shading compensation is performed in the shading compensation circuit 42 to each mode of operation (image reading mode / movement magnitude detection mode) of every.

[0051] In order to perform this shading compensation, the information for

amending pixel sensibility dispersion and lighting unevenness for every mode of operation beforehand is stored in the shading memory 43 and 44. A switch of these shading memory 43 and 44 is performed by the transfer switch 45 according to a switch of the sensor by the transfer switch 41. And image data [finishing / a shading compensation / in the case of image reading mode] is outputted to the CPU31 side through a transfer switch 46.

[0052] On the other hand, in the case of movement magnitude detection mode, the data after a shading compensation are supplied to an image memory 47 and the correlation operation part 48 through a transfer switch 46. The correlation operation part 48 performs data processing which calculates movement magnitude from the correlation operation of the image data for 12x12 pixels before [one] being stored in the image memory 47 (before 1 image), and the present image data. The movement magnitude information searched for by this correlation operation part 48 is outputted to the CPU31 side.

[0053] Thus, the CCD area sensor 18 for code information reading performs reading of 640x480 pixels per frame in reading actuation of per second 30 frames to the small-scale image sensors 22 for movement magnitude detection performing reading actuation of per second 1500 frames. since this has a limitation in the read-out time amount per pixel, if a frame rate is raised too much, read through the number of pixels of the reading range -- it is because it is lost. Moreover, when a frame rate is raised too much superfluously, the exposure time becomes short and there is also a problem to which S/N of a reading image falls.

[0054] In this way, reading actuation of code information and detection actuation of the movement magnitude using an image correlation operation can be switched by switching two sensors (CCD area sensor 18 / small-scale image sensors 22), reading for every sensor and switching a frame rate.

[0055] Consequently, the miniaturization of the body of equipment can be performed compared with the case where the conventional movement magnitude detection equipment (see drawing 26) which combined a ball and two rotary encoders is used by performing a movement magnitude detection function using small image sensors, and the packaging of the reading function of the code information by the reading optical system 19 and the movement-magnitude detection function by movement magnitude detection equipment 23 can be carried out to the size of mouse extent of a conventional type.

[0056] In addition, while stopping transmission of mouse movement magnitude detection information with a switch of two modes of operation,

he is trying to switch off the strong directivity LED 20 for movement magnitude detection lighting in this operation gestalt. This has the semantics in which a mouse pointer prevents moving to the location besides an assumption by migration of the body of equipment under code information reading.

[0057] However, by one side, there is also an application of wanting to incorporate lamination and the code information on the larger range, about the reading information on multiple times using the equipment migration information in a code reading period. In this case, during the period in code information reading mode needs to continue moving the image sensors 22 for movement magnitude detection as actuation of the image reader concerning this operation gestalt. The cautions to which it is made for the illumination light of the strong directivity LED 20 not to simply go into the range of a code information reading aperture in this case are needed.

[0058] For example, as shown in drawing 11 (a), when the configuration which arranges the strong directivity LED 20 to the back side (opposite side of the reading aperture 14) of the movement magnitude detection aperture 25 is taken The leakage light in which the optical axis of the exposure light of the strong directivity LED 20 was applied to the range of the reading aperture 14 which reads code information, consequently light guided between the equipment case 11 and manuscripts 13 will start the reading aperture 14, and will affect reading information precision.

[0059] As shown in drawing 11 (b), it is necessary to consider, in order to prevent this by taking the configuration which arranges the strong directivity LED 20 to the front side (reading aperture 14 side) of the movement magnitude detection aperture 25 so that the optical axis of the exposure light of the strong directivity LED 20 may not be applied to the range of the reading aperture 14. Moreover, it is good also as the light source omitted as this cure at the time of reading actuation by making the color of the exposure light of the strong directivity LED 20 into green (G).

[0060] Moreover, although considered as the configuration which switches two modes of operation by the carbon button click on a S/W screen with this operation gestalt, an approach to switch a mode of operation is not restricted to this. For example, it is also possible to assign a mouse button click to a combination setup with the Shift-key of the keyboard which is one of the PC peripherals, the Alt key, etc., and to prepare an exclusive carbon button in the mouse itself.

[0061] [2nd operation gestalt] drawing 12 is the internal configuration

Fig. showing the outline of the configuration of the image reader concerning the 2nd operation gestalt of this invention.

[0062] In drawing 12 , the equipment case 51 is making the configuration which curved so that the upper part might tend to have fitted a palm, and equips the anterior part with two manual operation buttons 52a and 52b. These manual operation buttons 52a and 52b are formed in order to input the actuation information by click actuation by PC user, and they have light transmission nature.

[0063] And in order to prevent the red component of an unnecessary disturbance light entering in the equipment case 51, manual operation buttons 52a and 52b have the spectral characteristic of the cyan color which absorbs a wavelength component 600nm or more, as shown in drawing 3 . In addition, in the following explanation, the manual operation buttons 52a and 52b which have light transmission nature shall be called for short the transparent manual operation buttons 52a and 52b.

[0064] The reading aperture 54 which demarcates the reading area of a manuscript 53 is formed in the base in the equipment case 51 at the lower part location of manual operation buttons 52a and 52b. Moreover, LED 55a-55d of the red whose peak wavelength with the spectral characteristic as shown in drawing 4 is about 660nm is arranged at a time in the one upper part of four corners of the reading aperture 54 as a lighting means for illuminating the reading area (code information) of a manuscript 53 through this reading aperture 54.

[0065] Near the reading aperture 14 in the equipment case 51, the strong directivity LED 56 for the movement magnitude detection for detecting the movement magnitude of the body of equipment besides LED 55a-55d for manuscript lighting is arranged. And the part of the reading aperture 54 is illuminated with LED 55a-55d for manuscript lighting, and the strong directivity LED 56. In LED 55a-55d for code information lighting, the whole area of for example, 21x28mm size is illuminated, and, specifically, about 4mm area is partially illuminated with the strong directivity LED 56.

[0066] Moreover, the dichroic mirror 57 is formed above the reading aperture 54 in the condition of having inclined to the base of the equipment case 51. Wavelength reflects light 600nm or more, and this dichroic mirror 57 has the spectral characteristic which is penetrated about the light which is less than it, as shown in the property Fig. of drawing 5 . About the light in which wavelength is less than 600nm among the light which spaced and carried out incidence of the transparent manual operation buttons 52a and 52b by this, a dichroic

mirror 56 is spaced and incidence can be further carried out to the interior of the equipment case 51.

[0067] Thus, the light in which wavelength is less than 600nm spaces a dichroic mirror 57 from the exterior of the equipment case 51, a manuscript 53 is irradiated, when the light in which wavelength is less than 600nm among the light further reflected with the manuscript 53 penetrates a dichroic mirror 57, manual operation buttons 52a and 52b are spaced from the exterior of the equipment case 51, and the reading station of a manuscript 53 can be checked.

[0068] In the equipment case 51, the image formation lens 58 and image sensors 59 are further arranged on the right-hand side of the dichroic mirror 57. From the dichroic mirror 57 side, these image formation lens 58 and image sensors 59 are allotted so that an optical axis may become almost parallel to a base in that sequence. As image sensors 59, X-Y address type image sensors (area sensor), for example, CMOS image sensors, are used.

[0069] Since the dichroic mirror 57 has the property of reflecting light with a wavelength of 600nm or more as point ** was carried out, it reflects the reading light reflected from the reading area of a manuscript 53 based on the exposure light irradiated from LED 55a-55d for manuscript lighting, or the strong directivity LED 56 in the direction of the image formation lens 58 and the CMOS image sensors 59. In addition, in image reading mode, only LED 55a-55d for manuscript lighting emits light, and the strong directivity LED 56 emits light in movement magnitude detection mode so that it may mention later.

[0070] The image formation lens 58 carries out image formation of the reading light reflected with the dichroic mirror 57 on the image pick-up side of the CMOS image sensors 59. With the image formation lens 58, the CMOS image sensors 59 carry out photo electric conversion of the manuscript image by which image formation was carried out per pixel, and output it as an analog picture signal.

[0071] The reading range of the CMOS image sensors 59 to the reading area of the reading aperture 54 is shown in drawing 13 . In this drawing, the whole image pick-up area 59A becomes the image reading range, and the field of the upper limit center section of image pick-up area 59A is set to movement magnitude detection range (movement magnitude information sensing range) 59B. Here, in illuminating movement magnitude detection area with the strong directivity LED 56, movement magnitude detection range 59B is set as the edge of image pick-up area 59A for being easy to illuminate the direction which had the lighting part in the edge of the reading aperture 54.

[0072] By the way, since the CMOS image sensors 59 can read at random each information on the pixel arranged in the shape of a matrix per pixel by carrying out addressing to X(train) Y (line) unlike CCD mold image sensors, they become possible [reading the pixel information only on the range restricted among image pick-up area 59A by the high frame rate]. Below, the internal configuration of the CMOS image sensors 59 and actuation are explained.

[0073] Drawing 14 is the outline block diagram showing the principal part of the CMOS image sensors 59. In addition, although here takes and shows the case of the pixel (cel) array for three-line three trains to the example for simplification of a drawing, many unit cells will be arranged rather than this in fact.

[0074] In drawing 14 , corresponding to the cel array for three-line three trains, the perpendicular address line 61-1 to 61-3 and the perpendicular signal line 62-1 to 62-3 are wired in the shape of a matrix, and a unit cell 63 is arranged by those intersection parts in the shape of matrix two-dimensional, and constitutes the image pick-up section 60 into them. The unit cell 63 has the composition of having the reset transistor Qres which resets the signal charge of the selection transistor Qsel which chooses Rhine (line) which reads the magnification transistor Qamp which makes photo electric conversion, and which amplifies Photodiode PD and its detecting signal, for example, and a signal, and Node Nsig.

[0075] The perpendicular shift register 64 which makes a vertical scanning is formed to the array of this unit cell 63. One edge each of the perpendicular address line 61-1 to 61-3 is connected to the outgoing end of each transfer stage of this perpendicular shift register 64, and one edge each of the reset line 65-1 to 65-3 is connected to the reset edge.

[0076] The gate electrode of the selection transistor Qsel is connected to the perpendicular address line 61-1 to 61-3 for every line, and the gate electrode of the reset transistor Qres is connected to the reset line 65-1 to 65-3 for every line. And from the perpendicular shift register 64, perpendicular address pulse phiVad1 - phiVad3, and reset pulse phiVres1 - phiVres3 are outputted in order in the case of a vertical scanning, and is impressed to the perpendicular address line 61-1 to 61-3, and the reset line 65-1 to 65-3 at it, respectively.

[0077] Between one edge each of the perpendicular signal line 62-1 to 62-3, and the power-source (VDD) line 66, the load transistor 67-1 to 67-3 is connected. The noise limiter circuit 68-1 to 68-3 is connected to each other end of the perpendicular signal line 62-1 to 62-3, respectively. Each of a noise limiter circuit 68-1 to 68-3 consists of the clamp capacity Cclp, a clamp transistor Qclp, a sample hold transistor Qsh, and clamp

capacity Cch.

[0078] As for the clamp capacity Cclp, the end is connected to each other end of the perpendicular signal line 62-1 to 62-3 in these noise limiter circuits 68-1 to 68-3. The clamp transistor Qclp is connected between the other end of the clamp capacity Cclp, and the clamp power-source (VCLP) line 69, and the gate electrode is connected to the clamp control line 70. Clamp pulse phiCLP is supplied to this clamp control line 70 from the timing generator (see drawing 16) mentioned later.

[0079] The main electrode (a drain / source electrode) of one of these is connected to the other end of the clamp capacity Cclp, and, as for the sample hold (S/H) transistor Qsh, the gate electrode is connected to the sample hold control line 71. Sample hold pulse phiS/H is supplied to this sample hold control line 71 from the above-mentioned timing generator. The clamp capacity Cch is connected between the main electrode (the source / drain electrode) of another side of the sample hold transistor Qsh, and the gland.

[0080] The main electrode of another side of an each outgoing end Qsh of a noise limiter circuit 68-1 to 68-3, i.e., a sample hold transistor, is connected to the level signal line 73 through the level selection transistor 72-1 to 72-3. The level selection pulse phiH1 to phiH3 by which a sequential output is carried out from each transfer stage of the level shift register 74 is impressed to each gate electrode of the level selection transistor 72-1 to 72-3.

[0081] Next, actuation of CMOS inverter 59 of the above-mentioned configuration is explained using the timing chart of drawing 15 .

[0082] First, if perpendicular address pulse phiVad1 of the high level (it is hereafter described as "H" level) of the perpendicular shift register 64 is outputted from the 1st step and it is impressed by the perpendicular address line 61-1 of the 1st line, the perpendicular selection transistor Qsel of the 1st line turns on. Thereby, a source follower circuit consists of a magnification transistor Qamp of the 1st line, and a load transistor 67 (67-1 to 67-3).

[0083] And an electrical potential difference almost equivalent to the gate voltage of the magnification transistor Qamp, i.e., the cathode electrical potential difference of Photodiode PD, appears in the perpendicular signal line 62-1 to 62-3. At this time, clamp pulse phiCLP is impressed to the gate electrode of the clamp transistor Qclp through the clamp control line 70 in each of a noise limiter circuit 68-1 to 68-3. Thereby, the clamp transistor Qclp turns on and the clamp nodes Nclp1-Nclp3 are fixed to the same electrical potential difference as the

clamp power source VCLP (clamp).
[0084] Subsequently, reset pulse phiVres1 of "H" level is outputted from the perpendicular shift register 64 in OFF of the clamp transistor Qclp, and it is impressed by the reset line 65-1. Thereby, the reset transistor Qres of the 1st line turns on and the signal charge of Node Nsig is reset. Then, the difference of an electrical potential difference when the time of there being a signal charge of Photodiode PD and a signal charge are reset is added to the clamp power source VCLP, and the added electrical potential difference appears in the clamp nodes Nclp1-Nclp3.
[0085] Subsequently, sample hold pulse phiS/H is impressed to the gate electrode of the sample hold transistor Qsh through the sample hold control line 71. Thereby, sample hold pulse phiS/H turns on and the signal level of the clamp nodes Nclp1-Nclp3 is transmitted to the sample hold capacity Csh.
[0086] Then, the level selection pulse phiH1 to phiH3 is outputted in order from the level shift register 74, and it is impressed by each gate electrode of the level selection transistor 72-1 to 72-3. Thereby, the level selection transistor 72-1 to 72-3 carries out sequential ON, and outputs the electrical potential difference between both ends of the sample hold capacity Csh to the level signal line 73. Consequently, sequential derivation of the signal for one line is carried out from the level signal line 73.
[0087] All the pixel signals of the unit cell 63 by which two-dimensional array was carried out can be read by continuing a series of above actuation one by one with next Rhine and its next Rhine. In the CMOS image sensors 59 of the above-mentioned configuration, since the electrical potential difference of the difference of the time of finally there being a signal in the clamp nodes Nclp1-Nclp3 and the time of being reset and there being no signal appears, the noise by the threshold variation of the magnification transistor Qamp is controlled. That is, this is a noise cancellation operation of a noise limiter circuit 68-1 to 68-3.
[0088] Drawing 16 is the block diagram showing the configuration of magnification mold MOS image sensors including the timing generator and output amplifier which drive the image pick-up section 60, the perpendicular shift register 64, and the level shift register 74, and attaches and shows the same sign among drawing to drawing 14 and an equivalent part.
[0089] Generally, the magnification mold MOS image-sensors device carries the timing generator 75 and the output amplifier 76 which drive these in addition to the image pick-up section 60, the perpendicular shift register 64, and the level shift register 74 so that clearly from drawing

16 . In addition, the configuration which has arranged the perpendicular shift register 64 as perpendicular shift registers 64A and 64B on right-and-left both sides of the image pick-up section 60 is taken here.

[0090] And while a timing generator 75 generates the basic timing of the drive frequency of these magnification mold MOS image sensors, various kinds of timing pulses which drive the perpendicular shift registers 64A and 64B, the level shift register 74, and the output amplifier 76 are generated. In addition, it is omitting here about the noise limiter circuit 68-1 to 68-3 in drawing 14 .

[0091] All read-out scans of such image sensors are governed by various kinds of timing signals generated with the timing generator 75. By explanation of operation which carried out point **, all the cels (pixel) 63 of the image pick-up section 60 were scanned everywhere, and all the so-called pixel read-out modes that read the signal of all pixels were explained. All these pixel read-out modes turn into image reading mode.

[0092] On the other hand, it is also possible to set up the so-called partial pixel read-out mode which reads only the signal of some pixels of the image pick-up section 60 by the logical circuit configuration of a timing generator 75. This partial pixel read-out mode turns into movement magnitude detection mode. That is, in a timing generator 75, it can switch to read-out mode, all pixel read-out modes, and partial pixel read-out mode by changing the generating timing of various timing signals according to a mode switch.

[0093] The example of timing in the case of partial pixel read-out mode is shown in drawing 17 . In addition, although it was a setup which reads all 3x3-pixel signals in the case of the example of timing of drawing 15 , the case where the 2x2-pixel signal in 3x3 pixels is read shall be taken and explained to an example here. Specifically, the signal of the pixel of eye 1 in the 1st line and the 2nd line train and eye two trains shall be read.

[0094] Corresponding to each pixel of this limited range, the pixel signal of only the limited range can be read by generating the pulse for read-out to the timing of these pixels. Moreover, what is necessary is to turn ON the reset transistor Qres of a unit cell 63 for every line, and just to make it reset a signal charge about the pixel which is not read. Hereafter, the actuation is concretely explained using drawing 14 .

[0095] First, if perpendicular address pulse phiVad1 of "H" level of the perpendicular shift register 64 is outputted from the 1st step and it is impressed by the perpendicular address line 61-1 of the 1st line, the perpendicular selection transistor Qsel of the 1st line turns on. Thereby, a source follower circuit consists of a magnification transistor Qamp of the 1st line, and a load transistor 67 (67-1 to 67-3).

[0096] And an electrical potential difference almost equivalent to the gate voltage of the magnification transistor Qamp, i.e., the cathode electrical potential difference of Photodiode PD, appears in the perpendicular signal line 62-1 to 62-3. At this time, clamp pulse phiCLP is impressed to the gate electrode of the clamp transistor Qclp through the clamp control line 70 in each of a noise limiter circuit 68-1 to 68-3. Thereby, the clamp transistor Qclp turns on and the clamp nodes Nclp1-Nclp3 are fixed to the same electrical potential difference as the clamp power source VCLP.

[0097] Subsequently, reset pulse phiVres1 of "H" level is outputted from the perpendicular shift register 64 in OFF of the clamp transistor Qclp, and it is impressed by the reset line 65-1. Thereby, the reset transistor Qres of the 1st line turns on and the signal charge of Node Nsig is reset. Then, the difference of an electrical potential difference when the time of the signal charge of Photodiode PD being in the clamp power source VCLP and a signal charge are reset is added to the clamp power source VCLP, and the added electrical potential difference appears in the clamp nodes Nclp1-Nclp3.

[0098] Subsequently, sample hold pulse phiS/H is impressed to the gate electrode of the sample hold transistor Qsh through the sample hold control line 71. Thereby, sample hold pulse phiS/H turns on and the signal level of the clamp nodes Nclp1-Nclp3 is transmitted to the sample hold capacity Csh.

[0099] At this time, reset pulse phiVres3 of "H" level is outputted from the perpendicular shift register 64, and it is impressed by the reset line 65-3. Thereby, the reset transistor Qres in the unit cell 63 of the 3rd line turns on, and the signal charge of the node Nsig in the unit cell 63 of the 3rd line which does not read a pixel signal is cleared.

[0100] When it is going to read the signal of some pixels among all the pixels of the image pick-up section 60, processing of the signal charge in the exposure period collected on the node Nsig of the unit cell 63 which did not read becomes a problem. However, with the CMOS image sensors concerning this operation gestalt, as mentioned above, the above-mentioned problem can be coped with by clearing a signal charge using the reset line 65-3 periodically.

[0101] Then, the level selection pulse phiH1 and phiH2 are outputted in order from the level shift register 74, and it is impressed by the level selection transistor 72-1 and each gate electrode of 72-2. Thereby, the level selection transistor 72-1 and 72-2 carry out sequential ON, and output the electrical potential difference between both ends of the sample hold capacity Csh to the level signal line 73. Consequently,

sequential derivation of the signal for 2 pixels of the 1st line is carried out from the level signal line 73.

[0102] Subsequently, sequential derivation of the signal for 2 pixels of the 2nd line is carried out by performing the same processing as the 1st line fundamentally also to 2nd line 2 pixels. By this processing of a series of, the 2x2-pixel signal in 3x3 pixels can be read, consequently a read time required for one frame can be shortened. In the above-mentioned example, there are few the difference of the number of read-out pixels being small and pixels of one line, and, as for the effectiveness, the period (a perpendicular transfer period is called hereafter) when even the level signal line 73 reads a signal looks few from a ******** relatively.

[0103] However, in the case of the 640 pixel x480 pixel image sensors corresponding to VGA size, the percentage that a perpendicular transfer period occupies among level clock periods (a part for 780 clocks) is about ten percent, for example. Moreover, when the number of read-out pixels in movement magnitude detection mode is set to 72x72, since about 1/of the numbers of level read-out pixels is equivalent to 10, a level transfer period becomes twenty percent of a canonical mode by read-out pixel reduction. Furthermore, about 1/of the numbers of read-out Rhine is further set to 7 by making the vertical number of read-out pixels into 72 pixels. Doubling, time amount required for read-out serves as the abbreviation 1/35 of the normal mode.

[0104] The number of read-out pixels in movement magnitude detection mode is 72 pixel x72 pixel to the number of read-out pixels in code information reading mode (image information reading mode) being 640 pixel x480 pixel, and a read-out frequency being 30Hz by this, and a read-out frequency is about 1kHz. If the resolution of these image sensors is set as 600dpi (about 24 dot(s)/mm) by manuscript side conversion, in movement magnitude detection mode, the average of 2 pixel x2 pixel will be taken and it will become resolution equivalent to 12 dot(s)/mm.

[0105] It is equivalent to the S/N improvement by this equalization processing having increased light exposure 4 times. That is, he is trying to compensate reduction of the light exposure by the exposure time having become 1/35 of canonical modes in the image processing system concerning this operation gestalt by the measure which illuminates a narrow field intensively using the strong directivity LED 56 (see drawing 12), and the above-mentioned equalization processing.

[0106] By this specification, it is detectable to the passing speed of 1.0 m/sec for 1 second with reading actuation of 1000 frames from the ability

of movement magnitude detection of **1mm per frame to be performed.
[0107] Drawing 18 is the block diagram showing the configuration of the electric system of the image reader concerning the 2nd operation gestalt, and attaches and shows the same sign among drawing to drawing 12 and an equivalent part.
[0108] In drawing 18 , the actuation signal of the manual operation buttons 52a and 52b with the function of the click carbon button of a mouse is sent to CPU77 in this equipment. This actuation signal is sent to the body of PC through the USB driver 78 as signals, such as a right carbon button click and a left carbon button click. In the application side of the body of PC, the reading command of code information is returned to this equipment side based on the click signal of this mouse, and the mode then chosen.
[0109] By making this reading command into a trigger, CPU77 sends synchronizing signals, such as a vertical synchronization and a horizontal synchronization, to the CMOS image sensors 59 while carrying out the lighting drive of LED 55a-55d for manuscript lighting. After the CMOS image sensors 59 perform point ** drive actuation based on synchronizing signals, such as a vertical synchronization and a horizontal synchronization, they are outputted as a digital picture signal by built-in amplifier and a built-in A/D converter.
[0110] This digital picture signal is supplied to ASIC79 for image processings. Then, it is buffered as image data of a processing result by the memory in CPU77. CPU77 transmits the buffered image data to the body of PC through the USB driver 78, and goes into movement magnitude detection mode.
[0111] On the other hand, when not going into such code information reading mode, CPU77 changes the mode of the timing generator (see drawing 16) of the CMOS image-sensors 59 interior into code information reading mode. By this mode change, the CMOS image sensors 59 read the pixel signal of the range limited to movement magnitude detection, and supply that output signal to ASIC79. ASIC79 performs the same processing as the case of the 1st operation gestalt, detects movement magnitude, and sends the detection result to CPU77.
[0112] By taking the configuration which switches the code information reading mode which uses one CMOS image sensors 59 by the standard image reading specification, and the movement magnitude detection mode which reads only the pixel signal of the limited range to a high speed, as mentioned above Since the movement magnitude detection aperture 25 (see drawing 1) which was required of the 1st operation gestalt can be used also [aperture / 54 / reading] while being able to

reduce image sensors to one, a merit is large by the cost of equipment, and both sides of a miniaturization of equipment.

[0113] Moreover, the point which has the composition of being easy to change a specification into SEMIKASUTAMU is also one of the descriptions, without the timing generator part of the CMOS image sensors 59 having digital composition, and tampering with the configuration of the image-sensors part which is an analog configuration.

[0114] Although CMOS image sensors were used as image sensors with the image reader concerning the 2nd operation gestalt in [3rd operation gestalt] drawing 12 All the pixel read-out modes that replace with CMOS image sensors and read the signal of all pixels by standard speed in the image reader concerning the 3rd operation gestalt using a charge transfer mold area sensor, for example, a CCD area sensor, The configuration which switches the partial pixel read-out mode which reads only the signal of some pixels at high speed is taken.

[0115] Drawing 19 is the outline block diagram showing the configuration of the principal part of a CCD area sensor. Here, the case of 4 pixel x4 pixel pixel structure is taken and shown to the example for simplification of a drawing.

[0116] In drawing 19 , it consists of a photodiode, it is prepared for every vertical file of the pixel 81 (D1-D16) arranged in the shape of matrix two-dimensional, and these pixels 81, and the image pick-up section 80 is constituted by the perpendicular transfer register 82 which carries out the perpendicular transfer of the signal charge read from each pixel 81. The level transfer register 83 is connected to each destination side edge section of the perpendicular transfer register 82. Moreover, the output section 84 is connected to the destination side edge section of the level transfer register 83.

[0117] Next, the actuation for every mode in the CCD area sensor of the above-mentioned configuration is explained using the timing chart of drawing 20 and drawing 21 . In addition, in the CCD area sensor concerning this example, the perpendicular transfer register 82 shall drive with the perpendicular transfer clock phiV1 to phiV3 of a three phase circuit, and the level transfer register 83 shall drive by the level transfer clock phiH1 of two phases, and phiH2.

[0118] First, actuation in code information reading mode is explained using the timing chart of drawing 20 . The perpendicular transfer clock phiV2 and the pulse of eye three values of phiV3 read among the perpendicular transfer clocks phiV1 to phiV3 of a three phase circuit, it serves as pulses ROP1 and ROP2, and a signal charge is read from all the pixels 81 to the perpendicular transfer register 82 by these read-out

pulses ROP1 and ROP2.

[0119] Every 1 pixel of this read signal charge is shifted to the level transfer register 83 by the perpendicular transfer operation of 1 cycle by the perpendicular transfer clock phiV1 to phiV3 of a three phase circuit. The level transfer clock phiH1 and phiH2 are impressed to the period of the perpendicular transfer register 82 of operation, and the level transfer register 83 by four pulses. Thereby, the level transfer of the pixel signal for one line is carried out, and it is read to the output section 84.

[0120] Time [the time of the perpendicular transfer clock phiV2 and phiV3 being set to a voltage level high one step], i.e., when the read-out pulses ROP1 and ROP2 stand, after repeating this cycle 4 times, the signal charge stored in each pixel (photodiode) 81 is again read to the perpendicular transfer register 82. This repeat is actuation in the case of the code information reading mode which reads the signal charge of all 4 pixel x4 pixel pixels.

[0121] Then, actuation in movement magnitude detection mode is explained using the timing chart of drawing 21 . In this movement magnitude detection mode, a 2 pixel x2 pixel signal charge shall be read among 4 pixel x4 pixels. The actuation from the timing t0 after the signal charge was read from all the pixels 81 to the perpendicular transfer register 82 is explained.

[0122] At this time, all the signal charges read from the pixel 81 remain in the perpendicular transfer register 82 by t0. Here, the signal charge for one line (D13-D16) is shifted to the level transfer register 83 by the perpendicular transfer clock phiV1 to phiV3 being given to the perpendicular transfer register 82 by one clock. Then, by the level transfer period, by the level transfer clock phiH1 and phiH2 being given to the level transfer register 83 by two clocks, the level transfer of the signal charge for 2 pixels (D13, D14) is carried out, and it is read to the output section 84.

[0123] Next, the following signal charge for one line (D9-D12) is shifted to the level transfer register 83 by the perpendicular transfer clock phiV1 to phiV3 being again given to the perpendicular transfer register 82 by one clock. The signal charge (D9, D10) of one line as follows is added to the signal charge (D15, D16) which remains into the level transfer register 83 at this time where a level transfer is carried out by two clock last time.

[0124] And by the level transfer clock phiH1 and phiH2 being given to the level transfer register 83 by two clocks in a level transfer period, the level transfer of the signal charge (D9+D15, D10+D16) is carried out, and it is read to the output section 84. However, it is made to make it

concentrate in movement magnitude detection mode, so that the reflected light based on the illumination light may carry out incidence of the lighting by the strong directivity LED 56 (see drawing 12) to the pixel (D9, D10, D13, D14) of a CCD area sensor. Thereby, since a signal charge is not accumulated in a pixel (D15, D16), the effect of addition of a signal charge is not produced.

[0125] To this following timing, all the signal charges that remained in the perpendicular transfer register 82 by the perpendicular transfer clock phiV1 to phiV3 being given to the perpendicular transfer register 82 by two clocks are transmitted to the level transfer register 83. Then, the signal charge accumulated in the pixel 81 is again read to the perpendicular transfer register 82 because read to the perpendicular transfer clock phiV2 and phiV3 and pulses ROP1 and ROP2 stand. And all exposed signal charges are swept out last time by the level transfer clock phiH1 and phiH2 being given to the level transfer register 83 by four clocks.

[0126] In this example, although the effectiveness of reducing the number of read-out pixels is slight For example, it sets to a 659 pixel x495 pixel CCD area sensor (a dummy pixel is included with the number of clocks of a sensor in this case, and one frame is 780 pixel x525 pixel). Each signal charge of the dummy pixel for 15 lines and the usual pixel for 36 lines is read to usual, and it is made to read at once with a perpendicular transfer register about the signal charge for 484 lines in the second half.

[0127] Since it is the need by 72 clocks of a level transfer in standard specifications at a perpendicular transfer, a part for the perpendicular direction of about ten lines can be read from pulse timing spec. to 1 level Rhine period. Therefore, perpendicular read-out for 484 lines is compressible into the time amount for 48 lines. About a part for the first portion, if it reads by double exposure as mentioned above, it can read in the section for 25 lines. Since it can read by the time amount for about 73 lines in total, it can read by one seventh of the time amount of a criterion. Since about 1/of passing speed is set to 4 compared with the case of the image reader concerning the 2nd operation gestalt, although this is inferior on the engine performance, the function which switches the read-out time amount of one frame is realizable.

[0128] Although the configuration which both [gestalt / detection / object for code information reading and / movement magnitude / [4th operation gestalt]] used one image pick-up area in an area sensor chip in the image reader applied to the 2nd operation gestalt in time was taken, it is also possible to prepare two image pick-up area in one chip, and to use

these for the object for code information reading and movement magnitude detection separately. Hereafter, this is explained as the 4th operation gestalt.

[0129] Drawing 22 is the internal configuration Fig. showing the outline of the configuration of the image reader concerning the 4th operation gestalt of this invention. In drawing 22 , the same sign is attached and shown in drawing 12 and an equivalent part. The image reader concerning this operation gestalt has taken the same configuration as the image reader concerning the 2nd operation gestalt fundamentally, and differing is, for example in the point using CMOS image sensors for which it has two image pick-up area in one chip as image sensors 85.

[0130] The outline of the configuration of image sensors 85 is shown in drawing 23 . Into one chip, two image pick-up area 85A and 85B where sizes differ is formed, large image pick-up area 85A of size is used as image reading range (code information reading range), and small image pick-up area 85B of size is used as movement magnitude detection range (movement magnitude information sensing range) so that clearly from this drawing.

[0131] Thus, two image pick-up area 85A and 85B is formed in one chip, and it becomes possible to change a pixel consistency into the object for code information reading, and movement magnitude detection mutually by taking the configuration using these separately in two image pick-up area 85A and 85B. The configuration which sets as 24 dot(s)/mm by manuscript side conversion about image pick-up area 85A for code information reading, and is set as 12 dot(s)/mm by manuscript side conversion as an example about image pick-up area 85B for movement magnitude detection can be considered.

[0132] About signal processing of the output signal (pixel signal) of image sensors 85, the same processing as the case of the image processing system concerning the 1st operation gestalt is performed. Moreover, in producing the image sensors of such special structure, the X-Y address type image sensors with which custom-made ** is represented by comparatively easy CMOS image sensors are advantageous.

[0133] While adjoining the reading aperture 54 and arranging the movement magnitude detection aperture 86 currently used also [aperture / 54 / reading] to the back side, he is trying to illuminate the part with the strong directivity LED 56 with the image reader applied to the 2nd operation gestalt in connection with the image pick-up area of image sensors 85 being divided into two image pick-up area 85A and 85B. Image formation of the reflected light based on this illumination

light is carried out on image pick-up area 85B of image sensors 85 with the common image formation lens 58.

[0134] There is a merit which becomes simpler than the case of the image reader the conditions on a drive start the 2nd operation gestalt that what is necessary is just to be able to burn a certain chip on the chip same as it is conventionally as image sensors although read area becomes a little and large by forming the two image pick-up area 85A and 85B in one chip as mentioned above, and using these separately to object for code information reading and movement magnitude detection.

[0135] Although image information, such as code information on monochrome, was set as the reading object with each operation gestalt explained until now [[5th operation gestalt]], reading of color picture information, such as color code information, is also made possible with the 5th operation gestalt. Drawing 24 is the internal configuration Fig. showing the outline of the configuration of the image reader concerning the 5th operation gestalt of this invention.

[0136] In drawing 24 , the equipment case 31 is making the configuration which curved so that the upper part might tend to have fitted an operator's palm, and equips the anterior part with two manual operation buttons 92a and 92b. Manual operation button 12of carbon button [for left-hand side manual operation button 12a to order it reading actuation of an image among these manual operation buttons 92a and 92b] and right-hand side b is a carbon button for ordering it the lighting of a manuscript side.

[0137] The inspection hole 93 for looking in at the inside of the equipment case 91 is formed in the location between the grip part of a central housing and manual operation buttons 92a and 92b which an operator grasps by hand at the time of actuation with the width of face which is about 40mm on the top face of the equipment case 91. On the other hand, in the base of the equipment case 91, the reading aperture 95 which demarcates the reading area of a manuscript 94 is formed in the lower part location of an inspection hole 93.

[0138] As a lighting means for illuminating the reading area of a manuscript 94 through the reading aperture 95 in the equipment case 91, in order to enable it to also read a color picture, 1 set of LED sections 96a-96d which make a group LED of three colors of red, green, and blue are arranged above [each] four corners of the reading aperture 95. In the LED sections 96a-96d for this manuscript lighting, LED of three colors of red, green, and blue may have comes to emit light independently.

[0139] Near the reading aperture 95 in the equipment case 91, the strong

directivity LED 97 for the movement magnitude detection for detecting the movement magnitude of the body of equipment besides the LED sections 96a-96d for manuscript lighting is arranged. Red LED is used as directivity LED 97. And the part of the reading aperture 95 is illuminated with each LED sections [for manuscript lighting / 96a-96d] LED, and the strong directivity LED 97.

[0140] Moreover, it is prepared after the half mirror 98 has inclined to the base of the equipment case 91 above the reading aperture 95 in the equipment case 91, and the image formation lens 99 and the CMOS image sensors 100 are further arranged on the right-hand side of the half mirror 98. From the half mirror 98 side, this image formation lens 99 and the CMOS image sensors 100 are allotted so that an optical axis may become almost parallel to a base in that sequence.

[0141] Here, although a half mirror 98 will be located between an inspection hole 93 and the reading aperture 95, since it penetrates the one half of the light reflected in respect of the manuscript, it does not bar the optical path which checks a manuscript side through an audit window 95 from an inspection hole 93. That is, from an inspection hole 93, a half mirror 98 can be spaced and the reading area of a manuscript can be further checked through the reading aperture 95.

[0142] A half mirror 98 is further reflected in the direction of the image formation lens 99 and the CMOS image sensors 100 about the remaining one half of the light reflected in respect of the manuscript. The image formation lens 99 carries out image formation of the light (reading light) reflected by the half mirror 98 on the image pick-up side of the CMOS image sensors 100. With the image formation lens 99, the CMOS image sensors 100 carry out photo electric conversion of the manuscript image by which image formation was carried out per pixel, and output it.

[0143] Since the configuration which used the CMOS image sensors 100 as image sensors is taken, in the case of CMOS image sensors, with the image reader concerning this operation gestalt, exposure period phases differ in each line by the relation which reads a pixel signal per line. In the line of the beginning of read-out, and the last line, since exposure periods almost differ by one frame, as shown in the timing chart of drawing 25 , a lighting period is established by two frames for every color, and the output of the period corresponding to the 2nd frame is read from this as reading image information of each color.

[0144] The point applied to the image reader of the configuration which can read color picture information, such as the image reader of the above-mentioned configuration, i.e., color code information etc., is the part by which it is characterized [of the 5th operation gestalt].

Therefore, although detection actuation of the movement magnitude in movement magnitude detection mode is not described, it shall be carried out here based on the detection principle in the image reader concerning the 1st operation gestalt.

[0145]

[Effect of the Invention] Since two equipment functions can give one equipment, without enlarging equipment by having contained a reading means read the image of the field of the request in a manuscript optically, and a detection means detected the information relevant to a motion of an equipment case optically, to the same equipment case according to this invention as explained above, it is small and the image reader suitable for pocket use can offer.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the internal configuration Fig. showing the outline of the configuration of the image reader concerning the 1st operation gestalt of this invention.

[Drawing 2] It is the plan of the case of the image reader concerning the 1st operation gestalt.

[Drawing 3] It is the property Fig. showing the optical property of a manual operation button.

[Drawing 4] It is the property Fig. showing the spectral characteristic of LED for manuscript lighting.

[Drawing 5] It is the property Fig. showing the spectral characteristic of a dichroic mirror.

[Drawing 6] It is the block diagram showing the configuration of the electric system of the image reader concerning the 1st operation gestalt.

[Drawing 7] It is drawing showing the configuration of the S/W screen at the time of going into image reading mode.

[Drawing 8] It is drawing showing the state transition at the time of going into code information reading mode.

[Drawing 9] drawing showing the result of the easy single dimension operation in processing of movement magnitude detection -- it is -- (a) -- the example of reading image data -- (b) -- ****** et al. -- change of the correlation depended for carrying out is shown, respectively.

[Drawing 10] It is the block diagram showing the example of a configuration of the data-processing section in ASIC in the image reader

concerning the 1st operation gestalt.
[Drawing 11] It is drawing showing the example of arrangement over the movement magnitude detection aperture of LED for movement magnitude detection.
[Drawing 12] It is the internal configuration Fig. showing the outline of the configuration of the image reader concerning the 2nd operation gestalt of this invention.
[Drawing 13] It is drawing showing the configuration of the image pick-up area of the CMOS image sensors in the image reader concerning the 2nd operation gestalt.
[Drawing 14] It is the outline block diagram showing the principal part of CMOS image sensors.
[Drawing 15] It is a timing chart for explanation of CMOS image sensors of operation.
[Drawing 16] It is the block diagram showing the example of a configuration including the circumference circuit of the image reader concerning the 2nd operation gestalt.
[Drawing 17] It is a timing chart for explanation of partial pixel read-out mode of operation.
[Drawing 18] It is the block diagram showing the configuration of the electric system of the image reader concerning the 2nd operation gestalt.
[Drawing 19] It is the outline block diagram showing the configuration of the principal part of the CCD area sensor used with the image reader concerning the 3rd operation gestalt of this invention.
[Drawing 20] It is a timing chart for explanation of the code information reading mode in the 3rd operation gestalt of operation.
[Drawing 21] It is a timing chart for explanation of the movement magnitude detection mode in the 3rd operation gestalt of operation.
[Drawing 22] It is the internal configuration Fig. showing the outline of the configuration of the image reader concerning the 4th operation gestalt of this invention.
[Drawing 23] It is drawing showing the configuration of the image pick-up area of the image-sensors sensor used for the image reader concerning the 4th operation gestalt.
[Drawing 24] It is the internal configuration Fig. showing the outline of the configuration of the image reader concerning the 5th operation gestalt of this invention.
[Drawing 25] It is a timing chart for explanation of the image reader concerning the 5th operation gestalt of operation.
[Drawing 26] It is the outline block diagram showing the movement magnitude detection equipment of the conventional type which combined

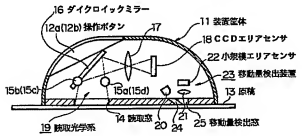
a ball and two rotary encoders.

[Description of Notations]

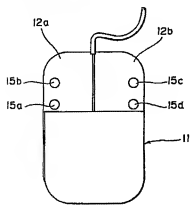
12a, 12b, 52a, 52b, 92a, 92b -- A manual operation button, 13, 53, 94 -- Manuscript, 14, 54, 95 -- A reading aperture, 15a-15d, 55a-55d, 96a-96d -- LED for manuscript lighting, 16 57 [-- LED for movement magnitude detection, 23 / -- 25 Movement magnitude detection equipment, 86 / -- 59 A movement magnitude detection aperture, 85,100 / -- CMOS image sensors, 98 / -- Half mirror] -- A dichroic mirror, 18 -- A CCD area sensor, 19 -- Reading optical system, 20, 56, 97

DRAWINGS

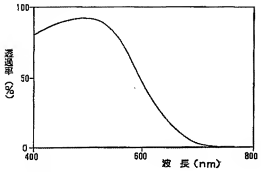
[Drawing 1]



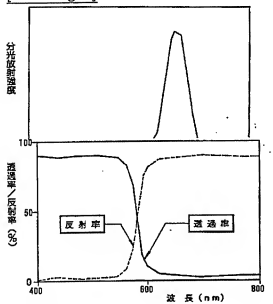
[Drawing 2]



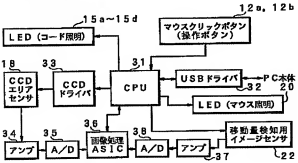
[Drawing 3]



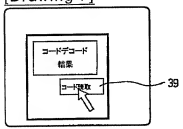
[Drawing 4]



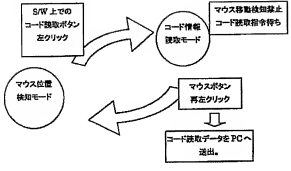
[Drawing 6]



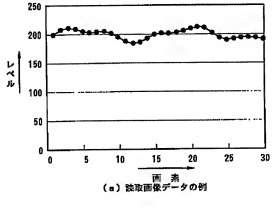
[Drawing 7]



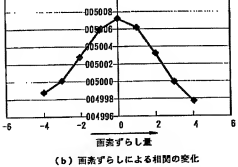
[Drawing 8]



[Drawing 9]

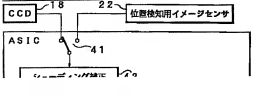


(a) 読取画像データの例

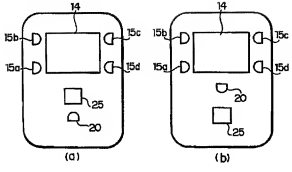


(b) 画素ずらしによる相関の変化

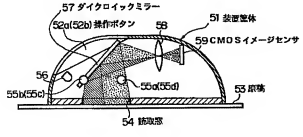
[Drawing 10]



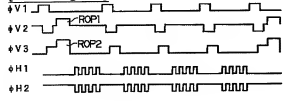
[Drawing 11]



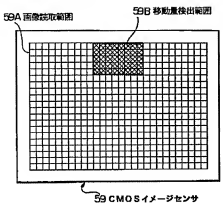
[Drawing 12]



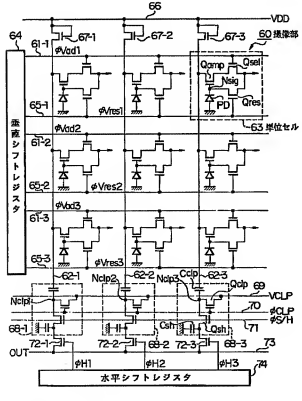
[Drawing 20]



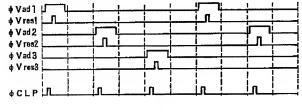
[Drawing 13]



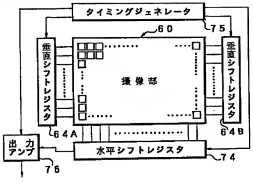
[Drawing 14]



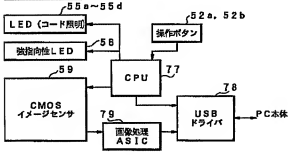
[Drawing 15]



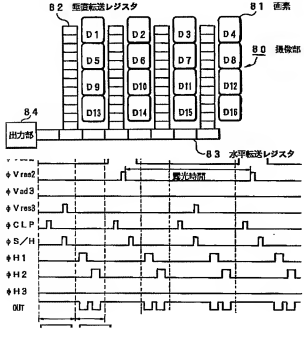
[Drawing 16]



[Drawing 18]

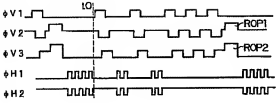


[Drawing 19]

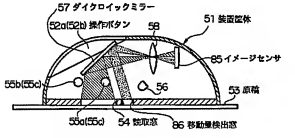


[Drawing 17]

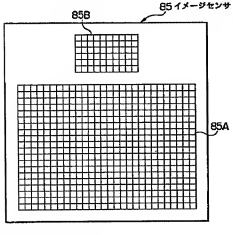
[Drawing 21]



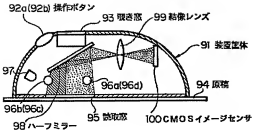
[Drawing 22]



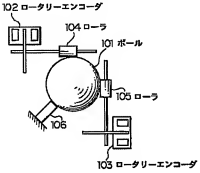
[Drawing 23]



[Drawing 24]



[Drawing 26]



[Drawing 25]